BUSI 2301 D Operations Management
Quiz 2 (Total Marks 50)
November 18, 2011

Maximum Time: 1 hour 30 minutes

Name: _____ Student ID: _____

Return this question sheet along with your answer sheet; be sure to write your **name** and **student ID** on the question sheet. Tests that cannot be fully identified may be assigned a mark of zero.

Texas Instruments BA II Plus calculators are permitted, as are printed non-electronic translation dictionaries (e.g., English-Spanish).

Section 1 - Multiple Choice (Total Marks 20)

For each multiple-choice question, choose the best answer from the list given and circle it on this question sheet. You may use scrap paper for your rough calculations, but only the final answer will be marked. Each question is worth [2] marks.

1. For the products A, B, C and D, which of the following could be a linear programming objective function?
   A) Z = 1A + 2B + 3C + 4D
   B) Z = 1A + 2BC + 3D
   C) Z = 1A + 2AB + 3ABC + 4ABCD
   D) Z = 1A + 2B/C + 3D
   E) all of the choices

2. In linear programming, sensitivity analysis is associated with:

   I. objective function coefficient
   II. right-hand side values of constraints
   III. constraint coefficient

   A) I and II B) II and III C) I, II and III D) I and III E) none of the choices

3. In the graphical method of linear programming, when the objective function is parallel to one of the constraints, then:
   A) the solution is suboptimal
   B) multiple optimal solutions exist
   C) a single corner point solution exists
   D) no feasible solution exists
   E) none of the choices

4. A shadow price reflects which of the following in a maximization problem?
   A) the marginal cost of adding additional resources
   B) the marginal gain in the objective that would be realized by adding one unit of a resource
   C) the net gain in the objective that would be realized by adding one unit of a resource
   D) the marginal gain in the objective that would be realized by subtracting one unit of a resource
   E) none of the choices

5. The goal of the basic EOQ model is to:
   A) minimize order size
   B) minimize order cost
   C) minimize holding cost
   D) minimize the sum of purchasing and ordering costs
   E) minimize the sum of ordering and holding costs

6. Which of the following is <u>not</u> true for the EPQ model?
   A) Usage rate is constant.
   B) Production rate exceeds usage rate.
   C) Run size exceeds maximum inventory.
   D) There are no ordering or setup costs.
   E) Average inventory is one-half maximum inventory.

7. The two different approaches to load work centres in job-shop scheduling are:
   A) load charts and schedule/control charts
   B) Gantt charts and assignment method
   C) infinite loading and finite loading
   D) linear programming and makespan
   E) none of the choices

8. In an A-B-C system, the typical percentage of the number of items in inventory for A items is about:
   A) 20 B) 30 C) 50 D) 80 E) 90

9. Which all of the following is <u>not</u> a function of inventory?
   A) meeting anticipated demand
   B) smoothing production requirements
   C) making the system more productive
   D) protecting against stock-outs
   E) All of the choices are functions of inventory.

10. Which of the following is not a measure for judging the effectiveness of a schedule sequence?
    A) average number of jobs at the work centre
    B) total number of jobs at the work centre
    C) average flow time
    D) average job lateness
    E) all of the choices are used

Section 2 - Calculation (Total Marks 30)

Complete your answer on this question sheet itself. You may use the back of your question sheet for rough calculations. Each question is worth [6] marks.

11. A service garage uses 120 boxes of cleaning cloths a year. The boxes cost $6 each. Ordering cost is $3 and holding cost is 10 percent of ordering cost per unit on an annual basis. Determine:
    (i) The economic order quantity
    (ii) The total cost of carrying the cloths (excluding purchase price)
    (iii) The average inventory

12. Determine the processing sequence for the six jobs shown below using Johnson's Rule. Chart the total completion time and the total idle time.

	Processing Time (hrs.)	
Job	Station 1	Station 2
a	4	6
b	9	8
c	10	5
d	6	9
e	9	7
f	12	10

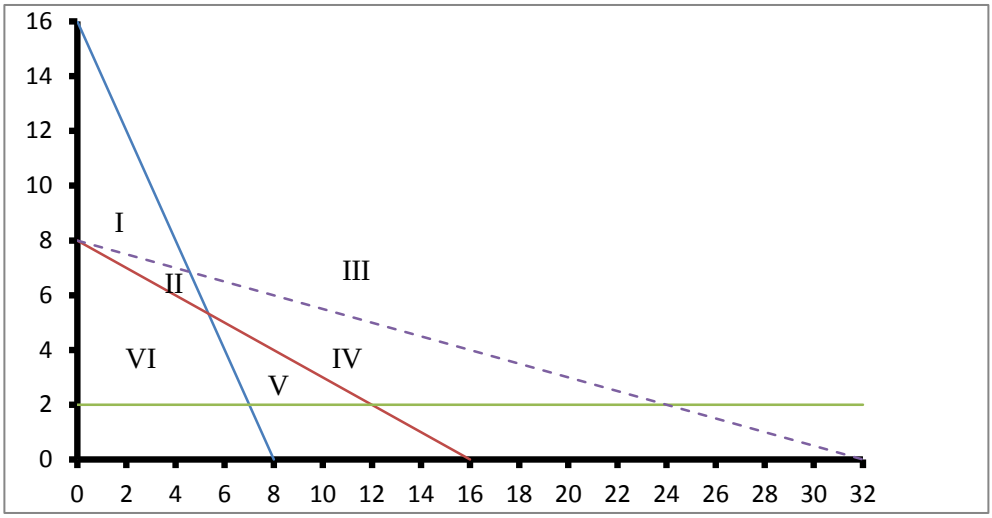
13. Consider the linear programming problem below:

Minimize Z = $2x + $8y

subject to:

$8x + 4y \geq 64$	constraint 1
$2x + 4y \geq 32$	constraint 2
$y \geq 2$	constraint 3

The graphical solution for the above problem is as follows:



a. Identify each of the model's three constraints (line) on the graph above.

b. Indicate which area of the graph forms the feasible region (circle the correct feasible region).

I	II	III	IV	V	VI

c. What is the optimal solution to the problem (x, y and Z), where Z is the objective function value; x and y are decision variables?

x:	y:	Z:

14. A manager has just received a revised price schedule from a vendor. What order quantity should the manager use in order to minimize total costs? Annual Demand is 120 units, ordering cost is $8, and holding cost is 8% of price.

Quantity	Unit price (in $)
1 - 39	14
- 59	13
- 89	12
90+	11

15. Using the information below, determine the following:
    (i) processing sequence using (1) SPT and (2) EDD and (3) MST rules.
    (ii) average flow time, average job lateness, and average WIP under each rule.

Job	Processing Time (days)	Due Date (days)
A	4	11
B	6	5
C	3	1
D	2	8
E	5	7

Formula Sheet

Inventory Management	
$TC_{min} = \frac{Q_{opt.}}{2}H + \frac{D}{Q_{opt.}}S$ $Q_{opt.} = \sqrt{\frac{2DS}{H}}$	$Length\ of\ order\ cycle = \frac{Q_{opt.}}{D}$ $\#\ of\ orders = \frac{D}{Q_{opt.}}$
$TC_{min} = \frac{I_{max}}{2}H + \frac{D}{Q_{opt.}}S$ $Q_{opt.} = \sqrt{\frac{2DS}{H}\left(\frac{p}{p-d}\right)}$	$Cycle\ Time = \frac{Q_{opt.}}{d}$ $Run\ Time = \frac{Q_{opt.}}{p}$ $I_{max} = \frac{Q}{p}(p-d)$
$TC_{min} = \frac{Q_{opt.}}{2}H + \frac{D}{Q_{opt.}}S + RD$	
Job Scheduling	
$average\ flow\ time = \frac{total\ flow\ time}{\#\ of\ jobs}$	$average\ job\ lateness = \frac{total\ job\ lateness}{\#\ of\ jobs}$
$average\ WIP = \frac{total\ flow\ time}{makespan}$	